

ABSTRACT

Comparison of Sampling Methods for Enumeration of Microorganisms
Associated with Sahara Dust in Trinidad and Tobago

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Sahara dust storms transport and deposit a sizable inoculum of microorganisms to downwind environments which can impact on ecosystem and human health in the Caribbean region. Previous culture-based studies on microorganisms showed contrasting results which may be due to variation in the collection and culturing methods. This study evaluated the influences of the main collection methods (impaction and filtration), sampling volume and culturing conditions (culture medium, incubation time and temperature) on the recovery of bacteria and fungi during the presence and absence of Sahara dust in Trinidad, West Indies. Aerosol samples were collected during 6 Saharan dust and 4 non-dust periods and samples were screened for the presence of culturable bacteria and fungi. The study found that the filtration method was superior in the collection of culturable microorganisms. Lower sampling volumes recovered more bacteria during dust events while fungal responses to different sampling volumes were variable. Generally, incubation at 22°C resulted in a better microbial recovery rate than the higher temperatures. Overall, the MA was the best medium for retrieving culturable bacteria during dust and non-dust conditions while both R₂A and PDA gave relatively high fungal counts. An

incubation time of at least 5 – 6 days was also found to necessary for colony development of significant proportions of bacteria and fungi. A total of 160 bacterial colonies were identified using 16S rRNA sequencing and majority of the isolates identified were spore-forming pigmented bacteria. The persistent strains of microorganisms were various species of the following genera: *Bacillus*, *Staphylococcus* and *Pseudomonas*. This study highlighted the importance in considering the collection and culture conditions when investigating microorganisms associated with Sahara dust in the Caribbean. This study also provided circumstantial evidence of the transport of plant pathogens and opportunistic human and animal pathogens by Sahara dust storms to Trinidad. As such these dust storms may play a significant role in Trinidad's ecosystem and population health.

Keywords: African dust; Trinidad; aeromicrobiology; bacteria; fungi; impaction; filtration; haemolytic bacteria; blood agar